



Quantifying Solar Energy

(Resource ID: 201)

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This teaching resource is allocated to following University:

BOKU - University of Natural Resources and Life Sciences Vienna

Institution:

Institute of Meteorology (BOKU Vienna)

<http://www.sustainicum.at/en/modules/view/201.Quantifying-Solar-Energy>



Individual work
Work in pairs
Group work
Plenum



**Independent of
the number of
students**



15 to 30 min
**Up to 3 lecture
units**



**Internet
connection
necessary**



English, German

This building block includes directions for conducting an experiment to demonstrate the power of the sun. A description of the basic conditions, which must be met in order to conduct the experiment, is also included.

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Basic Idea of the Building Block

The following experiment illustrates direct solar radiation focused on one point using a Fresnel lens. A test tube is filled with water and positioned at the focal point. Inside the test tube is a black (absorbing) area (on the side of the tube positioned away from the sun) that converts the sun's energy into heat. The majority of this heat is transferred into the water. The water

is brought to a boil. Using the test tube's built-in thermal element it is possible to observe changes in the water as it heats up.

This experiment should help students understand the energetic significance of the sun.

Description of the building block

This experiment must be carried out when the sun is shining in order for it to be successful.

A test tube with a specially made fixture is filled with water. A (focusing) Fresnel lens is aligned with the sun. It should be focused exactly on the lower part of the test tube.

The water is brought to a boil. Using the pre-measured amount of water (by weight) and the water temperature, the energy expended to boil the water can be calculated.

The building block is divided into four steps:

Step 1: Directions for the experiment/ technical description

Step 2: Experiment preparations

Step 3: Experiment execution

Step 4: Calculating the expended amount of energy

Course material include

A short introduction to the building block

A video (<http://youtu.be/4wiYOK7b1GI>)

A short theoretical explanation

Bibliography and further links

Teaching Tools & Methods



Mini-project



Video

formteaching_experiment

Learning Outcomes

This building block is appropriate for all courses that are hands-on, exercise-oriented and focus on solar energy. After having completed this experiment, students should recognize the energetic significance of the sun.

Relevance for Sustainability

This building block helps students to realize the potential of the sun as a renewable source of energy. The sun is one of the most environmentally friendly natural sources of energy on Earth.

Related Teaching Resources

No specific previous knowledge / related resources required

Preparation Efforts

Medium

Access

Free

Sources and Links

Video: <http://youtu.be/4wiYOK7b1GI>

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